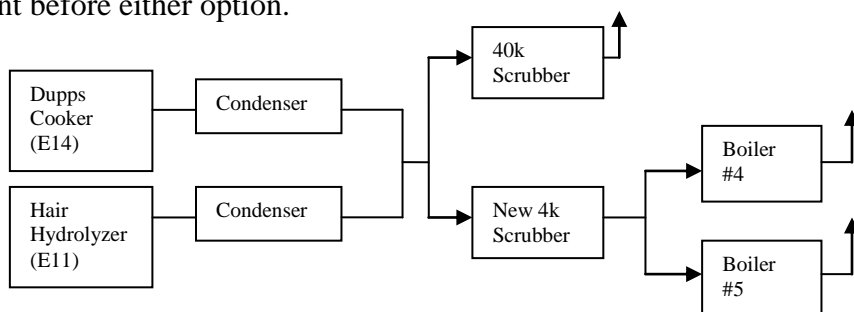


PTE Evaluation

Scope: Construction/Modification/Plantwide

Equipment: New 4k Wet Scrubber, make Integrated Environmental Services, Inc, model 4KV
 Existing Nebraska Boiler #4, 90 MMBtu/hr, Nat Gas, #2 fuel oil, or animal fat
 Existing Boiler #5, 63 MMBtu/hr, Nat Gas, #2 fuel oil, or animal fat
 Existing Dupps Cooker (E14)
 Existing Hair Hydrolyzer (E11)
 Existing 40k Scrubber
 Existing Two Condensers

The company is installing a new 4,000 acfm Wet Scrubber and then routing the vapors to either Boiler #4 or Boiler #5 with the existing 40k scrubber being a backup control device for E14 Dupps Cooker and E11 Hair Hydrolyzer). There will be a dedicated condenser for each emission point before either option.



Assumptions:

PM = PM₁₀ = PM_{2.5} for all equipment

Dupps Cooker maximum production = 50,000 lb/hr (from previous PTE, this application only claims 25,000 lb/hr)

PM loss = 0.10%

Hair Hydrolyzer maximum production = 4,000 lb/hr

PM loss = 0.05%

There are no TACs

PM outlet of the condensers and venturi scrubber = 2.7 lb/hr (Stack Test dated Nov 20, 2010) includes the addition of other emission points

VOC outlet of the condensers and venturi scrubber = 6.377 lb/hr (Stack Test dated Nov 20, 2010) includes the addition of other emission points

40k Scrubber PM eff = 65.7%

40k Scrubber VOC eff = 72%

75k Scrubber PM eff = 87.5%

75k Scrubber VOC eff = 80%

Assumed Venturi Scrubber eff = 75% for both VOC and PM

Assumed Condensers (4) eff = 75% for VOC only

Assume new 4k scrubber eff = 75% for both VOC and PM

Assume Boilers eff = 99% for VOC only

Calculations:

Assuming at maximum all the PM and VOC comes from E11 and E14

Assuming 90% of the PM and VOC comes from the Dupps Cooker

Dupps Cooker (E14)

$$((2.7 \text{ lbPM/hr})/(1 - 0.75))*0.90 = 9.72 \text{ lb/hr PM uncontrolled}$$

$$\text{PM emission limit} = 3.59P^{0.62} = 3.59(25)^{0.62} = 26.41 \text{ lb/hr}$$

$$((2.7 \text{ lbPM/hr})/(1 - 0.75))*0.90*(8760 \text{ hr/yr})*(ton/2000 \text{ lb}) = 42.57 \text{ PM tpy uncontrolled}$$

$$((6.377 \text{ lbVOC/hr})/((1 - 0.75)*(1 - 0.75)))*0.90*(8760 \text{ hr/yr})*(ton/2000 \text{ lb}) = 402.21 \text{ VOC tpy uncontrolled}$$

Primary Controls (New 4k Scrubber and either Boiler #4 or #5)

$$2.7 \text{ lbPM/hr}*0.90*(1 - 0.75)*(8760 \text{ hr/yr})*(ton/2000 \text{ lb}) = 2.66 \text{ tpy}$$

$$6.377 \text{ lbVOC/hr}*0.90*(1 - 0.75)*(1 - 0.99)*(8760 \text{ hr/yr})*(ton/2000 \text{ lb}) = 0.063 \text{ tpy}$$

Backup Controls (40k Scrubber and 75k Scrubber)

$$2.7 \text{ lbPM/hr}*0.90*(1 - 0.657)*(1 - 0.875)*(8760 \text{ hr/yr})*(ton/2000 \text{ lb}) = 0.46 \text{ tpy}$$

$$6.377 \text{ lbVOC/hr}*0.90*(1 - 0.72)*(1 - 0.80)*(8760 \text{ hr/yr})*(ton/2000 \text{ lb}) = 1.41 \text{ tpy}$$

Hair Hydrolyzer (E11)

$$((2.7 \text{ lb/hr})/(1 - 0.75))*0.10 = 1.08 \text{ lb/hr uncontrolled}$$

$$\text{PM emission limit} = 3.59P^{0.62} = 3.59(2)^{0.62} = 5.51 \text{ lb/hr}$$

$$((2.7 \text{ lb/hr})/(1 - 0.75))*0.10*(8760 \text{ hr/yr})*(ton/2000 \text{ lb}) = 4.73 \text{ tpy uncontrolled}$$

$$((6.377 \text{ lb VOC/hr})/((1 - 0.75)*(1 - 0.75)))*0.10*(8760 \text{ hr/yr})*(ton/2000 \text{ lb}) = 44.69 \text{ VOC tpy uncontrolled}$$

Primary Controls (New 4k Scrubber and either Boiler #4 or #5)

$$2.7 \text{ lbPM/hr}*0.10*(1 - 0.75)*(8760 \text{ hr/yr})*(ton/2000 \text{ lb}) = 0.30 \text{ tpy}$$

$$6.377 \text{ lbVOC/hr}*0.10*(1 - 0.75)*(1 - 0.99)*(8760 \text{ hr/yr})*(ton/2000 \text{ lb}) = 0.007 \text{ tpy}$$

Backup Controls (40k Scrubber and 75k Scrubber)

$$2.7 \text{ lbPM/hr}*0.10*(1 - 0.657)*(1 - 0.875)*(8760 \text{ hr/yr})*(ton/2000 \text{ lb}) = 0.051 \text{ tpy}$$

$$6.377 \text{ lbVOC/hr}*0.10*(1 - 0.72)*(1 - 0.80)*(8760 \text{ hr/yr})*(ton/2000 \text{ lb}) = 0.16 \text{ tpy}$$

Total Emissions for this project

$$\text{VOC} = 402.21 + 44.69 = 446.90 \text{ tpy uncontrolled}$$

$$\text{VOC} = 0.063 + 0.007 = 0.07 \text{ tpy with Primary Controls}$$

$$\text{VOC} = 1.41 + 0.16 = 1.57 \text{ tpy with Backup Controls}$$

$$\text{PM} = 42.57 + 4.73 = 47.30 \text{ tpy uncontrolled}$$

$$\text{PM} = 2.66 + 0.30 = 2.96 \text{ tpy with Primary Controls}$$

$$\text{PM} = 0.46 + 0.051 = 0.511 \text{ tpy with Backup Controls}$$

Conclusion: The potential uncontrolled emissions are the same before and after this project. The Hair Hydrolyzer (E11) and Dupps Cooker (E14) cannot exceed the PM emission limits

uncontrolled. The District has determined that the Condensers and Venturi Scrubber plus either the Primary Controls or the Backup Controls are VOC BACT.

Plantwide PTE

(See Spreadsheet for calculations)

Equipment

Unit	Attachment	Description
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Boilers

U1	143-81	63.76 MMBtu/hr Boiler #1 (E1), nat gas, #2 fuel oil, animal fat
U1	144-81	26 MMBtu/hr Boiler #2 (E2), nat gas, #2 fuel oil, animal fat
U1	145-81	25.1 MMBtu/hr Boiler #3 (E3), nat gas, #2 fuel oil, animal fat
U1	69-07	90 MMBtu/hr Boiler #4 (E4), nat gas, #2 fuel oil, animal fat, controlling E11 and E14 (primary)
U1	83-09	63 MMBtu/hr Boiler #5, nat gas, #2 fuel oil, animal fat, controlling E11 and E14 (primary)

Inedible Rendering Operations

U2	477-91	Holding Tank (E5)
U2	477-91	Blood Coagulator (E6)
U2	477-91	Grease Centrifuge (E7)
U2	477-91	Blood Dryer (E8), 2500 lb/hr, 3.5 MMBtu/hr, nat gas only
U2	477-91	Process Cyclone Separator (E9), 2500 lb/hr
U2	477-91	Process Cyclone Separator (E10), 2500 lb/hr
U2	477-91	Hair Hydrolyzer (E11), 4000 lb/hr
U2	1-01	Hammer Mill (E12), 15,000 lb/hr
U2	1-01	Grinder (E13a), 11,000 lb/hr
U2	1-01	Surge Hopper (E13b)
U2	1-01	Dupps Continuous Cooker (E14), 50,000 lb/hr input
U2	89-92	One Condenser controlling E14
U2	78-92	Venturi Scrubber controlling emissions from E5 through E8
U2	78-92	20k Scrubber controlling emissions from the wastewater treatment system
U2	341-95	75k Scrubber controlling fugitive emissions from E5 through E14
U2	788-08	40k Scrubber controlling E5 through E8; and backup for E11 and E14
U2	788-08	One Condenser controlling E11
U2	32252-11	4k Scrubber controlling E11 and E14 (primary)

Wastewater Treatment

U3	14-01	Wastewater Treatment System
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Miscellaneous

U4	522-08	Hot Melt Glue/Adhesive Machine
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Insignificant Activities

IA	30,000 gal #2 fuel oil Storage Tank
IA	Selo Hog Singer, 8.4 MMBtu/hr, nat gas only
IA	Two Alkar Cooker/Dryer, 1.73 MMBtu/hr each, nat gas only

Summary

Pollutant (tpy)	Combustion	Inedible Rendering	Wastewater Treatment	Misc	Total
NO _x	231.86				231.86
SO ₂	595.03				595.03
PM	94.36	50.808	3.504		148.67
PM ₁₀	94.36	50.808	3.504		148.67
PM _{2.5}	94.36	50.808	3.504		148.67
CO	102.16				102.16
VOC	6.69	475.33512	4.35372	0.06132	486.44
CO ₂	251192.13				251192.13
CH ₄	2.80				2.80
N ₂ O	2.68				2.68
CO ₂ e	252008.32				252008.32
Single HAP	2.189124				2.19
Total HAP	2.296094815			4.35372E-05	2.30

Conclusion:

The company is potentially major for NO_x, SO₂, PM₁₀, CO, VOC, and GHG. The source will take synthetic minor emission limits of < 50 tpy for NO_x, SO₂, PM₁₀ and CO, <5 tpy for VOC, and < 100,000 tpy of CO₂e to be a FEDOOP.